Vapor-by-Design Cathodes in Fusion Chambers for Heat Resistance

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Introduction

In response to reports from the Princeton Plasma Physics Laboratory regarding their latest efforts to coat the walls of toroidal fusion chambers in a way that maximizes resistivity to electrical flow, I have taken a fresh look at the problem of how to contain a fusion reaction without "melting the box."

Abstract

A great deal of thought has gone into how to get a fusion reaction going in the first place (something that eludes some to this day, even eight months after I shared my odderonic fusion concept with the world) but few researchers took as much time to figure out what mechanisms could be used to ensure the durability of any fusion chamber.

The fact that PPPL is now making it a priority to solve this problem would seem to hint that my own concept of generating odderons to drive fusion reactions is being rapidly developed, even if quietly. Given that PPPL's approach couldn't possibly work, I feel obliged to try to help solve this problem as well, as it is the last remaining half of the equation in need of solving.

The first issue with the current approach is the fact that contact between plasma and the walls of the plasma chamber is being permitted at all. The fact is, there is no substance that would not be melted or eroded in short order by this sort of plasma.

Striking to me is the assumption that 100% of the magnetic field needs to be oriented toward acceleration of the rotation of the plasma and that none of it can be spared to push plasma away from the walls. The majority of the force of the magnetic field post-ignition needs to be dedicated to repulsion of the plasma away from the walls of the reaction toroid. This means that we need the ability to redirect the orientation of the magnetic field as the system activates. Convection is required to support a process such as fusion, but the extreme rotational velocity of plasma in current experiments inhibits the convective dynamics which are needed to support such a reaction on a sustained basis.

Current approaches to fusion generation use a magnetic field both to accelerate plasma streams and to achieve confinement at the point of a fusion reaction in some designs. Given the ability to inject odderons in significant quantities into a plasma, magnetic confinement for the purpose of achieving fusion is unnecessary and counter-productive. Magnetic fields, however, will play an essential role both in preventing damage to the fusion chamber as well as the electrical cathodes; the points at which electrical energy is actually siphoned out of the plasma. The PPPL approach of meddling with resistivity is

particularly puzzling given that while it might prevent to some very small degree damage caused by electrons, anything (other than a magnetic field) used to prevent electron damage would only encourage proton damage.

It is my notion that an intense magnetic containment field shaped to encompass protruding electrical contacts within the toroid would both prevent fragments of the contacts from being carried away in the stream one atom at a time and would permit something that might be termed a magnetically-contained metal vapor cathode.

In this design, while a series of magnetic fields constantly push plasma away from the walls of the toroid generally, the magnetic field that contains the cathode must hold it in place, even when its temperature renders it as a liquid and, ultimately, as a vapor. Thus, the cathode would be both magnetically suspended as well as confined. This would give such a fusion chamber the exceptional quality of containing both a high-temperature plasma moving at high speed as well as a metal cathode (or, more than likely, a series of cathodes running around the perimeter of the toroid) that must be kept entirely stationary that is/are a solid, a liquid, and a vapor at the same time, depending upon how close that section of the contact is to the plasma stream.

Conclusion

While this approach does call for a high degree of magnetic field precision for cathode confinement, I believe it to be within our capabilities and the only viable approach toward the goal of the creation of a practical fusion chamber of any durability.

Note: The later publication of 7 November 2023 indeed, provides yet another alternative to extracting energy for toroidal fusion chambers wherein a high-efficiency, heat-resistant photovoltaic based upon the encapsulation of a soft crystal within a hard crystal under an enduring condition of extreme pressure may be used to capture SASE-enhanced LASER light which is projected through the odderon-enhanced QGP. A vapor-based cathode remains a perfectly valid approach and both approaches have their merits.